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June 30, 1951

INDEX

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



by Condor

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## MEDICINE

## Anti-Radiation Factor

**Find an anti-bomb substance in body tissues that gives promise of break-through in search for methods of radiation treatment.**

► AN ANTI-ATOM bomb substance in body tissues that markedly helps animals survive killing doses of irradiation has been discovered by an Argonne National Laboratory—University of Chicago professor.

It gives "promise of a break-through in the search for methods of treatment" of atomic bomb radiation injury and is "the outstanding contribution" of the year to this problem, another University of Chicago professor, Dr. Franklin C. McLean, declared at the meeting of the American Medical Association in Atlantic City, N. J.

The existence of the anti-atom bomb substance was discovered by Prof. Leon O. Jacobson. In earlier research Prof. Jacobson found that lead shielding of the spleens of mice protected them from killing doses of X-rays. Next he found that transplanting spleens of baby or grown-up mice into other mice up to two days after they have been given killing doses of irradiation significantly increased their survival.

Very recently, Prof. McLean reported, Prof. Jacobson has found that "press juice" from unborn mice injected into other mice after doses of rays that kill 99% of exposed animals saves eight of 27, or a little better than 30% of the mice. "Press juice" from spleens as well as from whole mouse embryos carries this anti-irradiation factor.

## ASTRONOMY

## Star's Age Sets Its Speed

► YOUNG STARS may shine with the brightness of hundreds of thousands of suns, but it is the old stars, formed in the original creation of the universe, that are speeded through space.

Stars formed in the original creation of the universe, and thus about three billion years old, are quite different from stars formed and continuously forming ever since from interstellar clouds of gas and dust, Drs. Martin Schwarzschild and Lyman Spitzer, Jr., both of Princeton University Observatory, told members of the American Astronomical Society meeting in Washington.

These old original stars and the young, newly-created stars should be considered as the two main types of stars that shine so brightly in the Milky Way, the astronomers suggested.

None of the primeval stars gives off more than 2,000 times as much light and

The substance that has the anti-irradiation effect has not yet been isolated. It acts to save the mice by restoring the function of the blood-forming bone marrow.

Female sex hormones and three other chemicals, cysteine, glutathione and para-aminopropiophenone, have been shown to ward off irradiation injury when given to animals before exposure. These might prove useful for protecting the crew of a nuclear-energy-propelled aircraft while on a mission, but "it is doubtful," Prof. McLean said, whether they would be of much use for the civilian population or troops in the field.

"The best protection against radiation is still external, or shielding," he declared.

This might vary, he suggested, from partial shielding of the pilot's seat in a plane to a trench, foxhole or concrete or brick walls.

Blood transfusions, to overcome the anemia following irradiation, should be reserved until the second week after damage, he stated.

He declared "there is no evidence" for the general opinion that mass transfusions of whole blood will prove a life-saving specific for radiation injury. The effects of transfusions on such injury, he added, are now "fortunately" being re-evaluated.

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heat energy every second as our sun. But a few cloud stars, some only a few hundred million years old, are unusually bright, shining with the brightness of 100,000 suns. Only young and spend-thrift stars, burning their atomic fuel rapidly, can shine so brightly; primeval stars that were once so bright ran out of fuel several billion years ago, and are now dark and invisible.

The youngest cloud stars move at random with an average speed of ten miles a second. This is because of the low average speed of the vast individual clouds, each some trillion miles across, which condense to form these new stars, Drs. Schwarzschild and Spitzer pointed out.

Many older cloud stars have doubled this speed and are now traveling 20 miles a second. A cloud star is gradually accelerated by the gravitational pull of vast cloud banks, not yet condensed into stars,

the astronomers suggest. Calculations show that this process within three billion years might about double a cloud star's speed.

Primeval stars, on the other hand, race across space, traveling a hundred miles a second or so. These great speeds cannot be explained in the same manner. They are probably due to violent chaotic motions in the primordial substance from which the universe was created.

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## MEDICINE

### Jelly-Like Colloids Prevent Kidney Stones

► JELLY-LIKE materials called colloids may be the means of saving thousands from the pain and suffering of kidney stones.

"Extremely encouraging" results from this attack on the kidney stone problem have been obtained by Dr. Ernst A. Hauser, professor of colloid chemistry at Massachusetts Institute of Technology and Dr. Arthur J. Butt of Pensacola, Fla.

The colloids are given by injection. Theory of the treatment is that formation of kidney stones is averted in the healthy person by the presence in the urine of certain types of colloid.

Study of several hundred patients shows that kidney stones occur most often in persons lacking these colloids in their urine, Dr. Hauser reported to an American Chemical Society meeting in Ithaca, N. Y.

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## GENERAL SCIENCE

### Heart Researcher Gets Lifelong Annual Grant

► SOMETHING NEW in research support, an annual grant for the productive life of the researcher, has been started by the American Heart Association.

This is said to be the first time a voluntary agency has undertaken a program providing for continuing careers of scientific investigators of proved ability and originality.

The first career investigator under the new program is Dr. Victor Lorber, associate professor of biochemistry at Western Reserve University, Cleveland. He is 39. He will receive a \$12,000-a-year stipend, plus a maximum of \$7,500 a year for technical assistance and supplies. The institution where he chooses to work will receive \$1,000 a year for overhead.

This type of research support, with its promise of independence for a lifetime of research, has long been urged by leading scientists as providing the "best climate" for medical research.

The American Heart Association hopes, as its income increases, to be able to support more such career investigators.

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## ASTRONOMY

# Universe Still Expanding

**Giant Hale telescope shows faint nebulae, 50% farther into space than previously penetrated, still follow puzzling "law of red-shift."**

► THE UNIVERSE continues to expand with extraordinary speed as far as the giant Hale telescope of Mt. Palomar has been able to detect the puzzling "red-shift" in light from faint nebulae or "universes."

The 200-inch mirror, equal in light-gathering to a million human eyes, has now captured evidence, in the hands of Dr. Milton L. Humason of Mt. Wilson and Palomar Observatories, that the "rainbow" spectra of nebulae light has a change that can be interpreted to mean that the nebulae 360 million light years away are rushing away at 38,000 miles per second, more than one-fifth the speed of light itself.

This most distant "red-shift" strengthens the idea that it is caused by an actual recessional velocity, caused by what can be considered an "explosion" of the universe along the lines of the Lemaître expanding universe theory first suggested over two decades ago.

The rate of red-shift continues half again farther into space's depths than reached with the 100-inch Mt. Wilson telescope a decade ago.

The great galaxies observed with four to six hours exposures made with the world's largest telescope were first located with the 48-inch Schmidt telescope, world's largest of its type.

Dr. Humason's report to the Astronomical Society of the Pacific, meeting at the University of Southern California in Pasadena, disclosed the discovery of 800 new clusters of nebulae during the two years of the National Geographic-Palomar sky survey, whereas only 20 were previously known.

To give you a scale of the universe: Light travels 186,000 miles a second. One light year is roughly six trillion miles. The most distant cluster of nebulae in which red-shift has now been observed, 360 million light years from earth, is two followed by 21 zeros miles away.

On the spectroscopic plates light dispersed by a prism is broken down into its component wavelengths in a spectrum only one-tenth of an inch long. Lines in that spectrum indicate the presence of particular wavelengths. With the distant object these lines are shifted about one-twentieth of an inch toward the red, or longer wavelength, end of the spectrum.

The shift has been explained by many astronomers as due to the "Doppler effect." This effect, for instance, is what causes the drop in pitch of a locomotive whistle as it speeds into the distance and its sound waves

are lengthened in relation to the listener.

If the shift actually is due to the Doppler effect, an implication would be that nebulae everywhere were catapulting away from us in all directions at speeds increasing with their distance—that the entire universe was expanding, like a giant balloon, at a tremendous rate.

The light observed from the most distant cluster studied to date left its source some 360 million years ago. At that time, on the velocity-shift interpretation, the cluster was roaring away at 38,000 miles a second. Since then it may have migrated 70 million light years deeper into space. The message

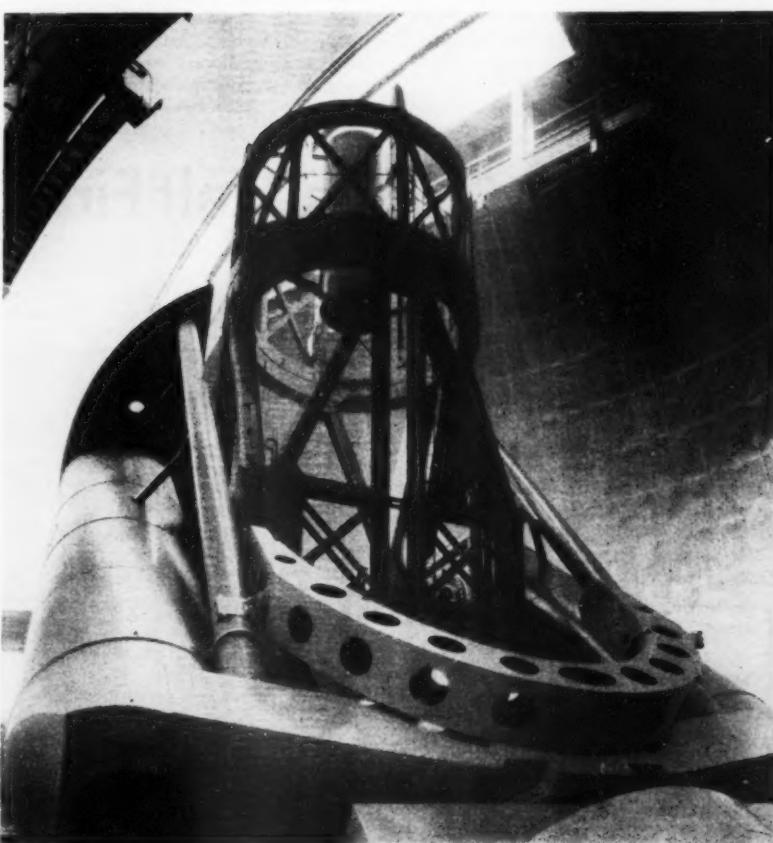
that tells what is happening to it today will reach earth several hundred millions of years from now.

A most important astronomical milestone will have been reached, if at some point in his continuing study, Dr. Humason should find that more distant clusters show red-shifts corresponding to velocity increases of less, or of more, than 100 miles a second for each million light years distance.

Should the red-shift be less than expected in that distant past, the interpretation would be that the rate of expansion of the universe has been speeding up since then. This would mean that the expansion began earlier than now indicated and that the "age of the universe" is more than the two billion years now supposed.

Should the red-shift be greater than expected, the reverse would be true.

Whether this evidence may be found is, of course, impossible to predict. Its interpretation depends, too, on an accurate knowledge of the distances involved and an



**GIANT TELESCOPE**—Searching far into the heavens, the Hale 200-inch reflector telescope at Palomar Observatory has shown that even at tremendous distances, light from nebulae has a red-shift, indicating these universes are speeding away from us.

answer to the question of whether red-shifts actually are velocity-shifts. A possibility exists that the light from far-off objects may have lost energy during its long, lonely journey through space, causing its wavelength to increase. In this case, some principle of nature as yet unknown would account for the red-shifts.

However, whether or not they represent speeds of recession, Dr. Humason said, the red-shifts promise to give astronomers a convenient yardstick to establish the distances of new-found objects in space. Once the red-shift is measured, the distance will automatically be known. This will be possible when the range of the law, now regarded as a first approximation, is pushed still farther into a cosmos and after uncertainties in distances assigned to outlying nebulae are removed.

The latter is the province of Drs. Edwin P. Hubble, Walter Baade and their colleagues. They report that construction of a thoroughly reliable scale of cosmic distance is now under way, using all the resources on Mt. Wilson and Palomar.

The over-all program involves not only photography but also extremely sensitive photoelectric cells developed during World War II. They are being used to measure the brightness of stars and nebulae several

million times fainter than the faintest stars the human eye can see.

Step by step, as outlined by Dr. Hubble, the distance scale will be set up as follows:

Globular clusters, or compact masses of thousands of stars, relatively near the earth, will be used to establish the distance of the great spiral nebula, Messier 31. This will fix the brightness of its Cepheids, or regularly varying giant stars, and its novae, or exploding stars.

Cepheids and novae then will be used to measure the distance of other nebulae as far out as the Ursa Major Cloud and the first cluster found in Virgo. These are roughly six and eight million light years away.

This done, the astronomers will have a collection of about a thousand nebulae of all types. The nebulae themselves can then be calibrated as distance indicators. Their average brightness, variations from the average and the brightest nebulae in clusters will provide a yardstick to measure the distance of more remote clusters.

"When the new scale is available," Dr. Hubble says, "the law of the red-shifts can be formulated precisely. It can then be discussed with confidence as a clue to the nature of the universe."

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#### METEOROLOGY

## Break Up Clouds, Halt Fires

► BREAKING UP clouds to prevent dry lightning that causes disastrous forest fires was urged by Dr. Carleton P. Barnes, research coordinator in the Department of Agriculture's Agricultural Research Administration. The clouds would be seeded with silver iodide or dry ice.

More research on actually trying to make it rain by similar methods is also needed, he told a House Interior subcommittee holding hearings on a bill to authorize the Interior Department to spend \$25,000,000 for research on rain-making and on "sweetening" salt water.

Lightning is the cause of many disastrous forest fires each year. By dissipating the towering cumulus clouds that are often the source of dry lightning storms in the Northwest and Southwest, Agriculture's Forest Service officials believe they could cut down considerably on the devastation from lightning-caused forest fires.

Breaking up clouds also has military applications. It might help to clear a target area for bombing runs or to clear an airport closed in by bad weather.

Evidence is much stronger that clouds can be broken up by seeding them with

silver iodide or dry ice than that man can actually make it rain, Dr. Barnes pointed out to the subcommittee.

If actually making rain should prove possible, this would also be of great value in helping to control forest fires. Some cloud seeders have made claims that they have put out fires, but these assertions can not be verified.

When forest fires are burning, even an increase in the air's humidity helps to slow down the fire's spread, making it easier to control by conventional methods.

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## ASTRONOMY

# Gas Between the Stars

**Interstellar space filled with very sparse hydrogen gas. Although invisible, direct evidence has been obtained with radio telescope.**

► THE SPACE between the stars is now definitely known to be filled with very sparse hydrogen gas. Invisible hydrogen gas, long believed to constitute most of the matter between the stars, has been detected physically. Small quantities of other gases undoubtedly exist there too, but hydrogen is the first gas to make its presence known.

Radio telescopes within the past few months have successfully obtained direct evidence of energy emissions from these vast areas of invisible hydrogen gas, Dr. H. C. van de Hulst of Leiden Observatory, The Netherlands, and Dr. Harold I. Ewen of Harvard University told members of the American Astronomical Society meeting at the National Bureau of Standards in Washington.

Until now, hydrogen gas in interstellar space could be observed only in regions close to hot stars, which ionize the gas. With radio telescopes astronomers for the first time have observed hydrogen gas in the vast regions of space where it is neutral.

There is as much matter in the space between the stars as there is in all the stars together. Most of this matter is assumed to

be neutral hydrogen gas. Thus for the first time man has observed the other half of matter contained in our galaxy. There is estimated to be about one atom of this free hydrogen in every cubic centimeter of space.

The manner in which this gas is distributed is fully as important as the distribution of stars. Further study is expected to give clues to the evolution of the system of stars to which we belong.

Our Milky Way galaxy is believed to resemble the Andromeda nebula, the only nebula easily seen with the unaided eye and visible these summer evenings, but actually we know less about its structure. We do not even know whether our galaxy has spiral arms, or how much of its mass is contained in the central nucleus. Exploration of invisible space with radio telescopes may help solve these problems.

Seven years ago, Dr. van de Hulst predicted that neutral hydrogen in interstellar space ought to emit energy of 21 centimeters wavelength, which could be picked up with delicate radio equipment. His radio astronomy research group in Holland during the last two years has attempted to observe this atomic radiation from the Milky Way, making this its chief project.

During Dr. van de Hulst's stay at Harvard Observatory this spring, he collaborated with Drs. Ewen and E. M. Purcell, also of Harvard. Less than three months ago, on March 25, Dr. Ewen first observed the 21-centimeter hydrogen radiation from the sky with a horn-shaped antenna on top of the Physics Laboratory at Harvard. Six weeks later, C. A. Muller confirmed the discovery in Holland, using an antenna with a higher resolving power.

The neutral hydrogen atom consists of a nucleus with one electron circling it. However, in addition to circling the nucleus, the electron itself is spinning. Dr. van de Hulst calculates that on the average the electron spin in an atom, not otherwise affected, will by some chance process be reversed about every 11,000,000 years. It is the energy released by this reversal of countless hydrogen atoms in space that is detected with the 21-centimeter radio receiver.

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## ● RADIO

Saturday, July 7, 1951, 3:15-3:30 p. m. EDT

"Adventures in Science," with Watson Davis, director of Science Service, over Columbia Broadcasting System.

Wayne Taylor, director of the Traveling Workshop, Texas State College for Women; Mrs. Lois Walker, supervisor of Lufkin High Schools, Lufkin, Texas; Mrs. Lillie Duncan, elementary teacher in Hamilton, Texas, will discuss "Traveling Workshop for Teachers."

## PHYSICS

### Disclose Telegram Gave Name to "Clementine"

► HOW "CLEMENTINE," the only known reactor that uses plutonium for fuel and liquid metal for cooling, got that name was disclosed by the Atomic Energy Commission.

The fast reactor was so named by a scientist who had helped to make plans for it at the Los Alamos Laboratory, Los Alamos, N. M., where the atomic pile is located, then left. But he still wanted to know how the work was going on.

All the work was classified, so this was the telegram he sent:

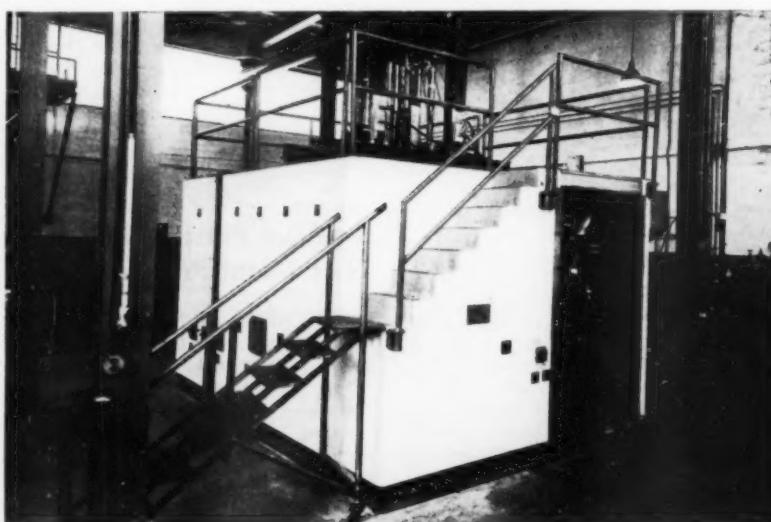
"In a cavern, in a canyon, extrapolating must be fine.

Since you're the miners, 49ers, tell me how is Clementine."

Since the reactor was being built in a canyon, and 49 was the code name for plutonium, the reactor crew had no trouble in translating his query. And Clementine was promptly adopted as the name for the reactor.

Heart of the machine is a bundle of plutonium rods arranged in a lattice. Around this bundle is a neutron reflecting material used to prevent neutrons from escaping, and outside of the reflector is a neutron and gamma shield.

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**"CLEMENTINE"**—The Los Alamos Scientific Laboratory's fast reactor, showing some of its details for the first time, is pictured above. Closet on the right holds equipment for circulating the mercury coolant. A metal door shields this machinery during operation.

## ASTRONOMY

# Gigantic Variable Stars

**Eighteen gigantic variable stars, each a billion miles across, discovered in southern skies. If centered on sun, many would overflow Jupiter's orbit.**

► **EIGHTEEN GIGANTIC** variable stars, each almost a billion miles across, have been detected in the southern skies, Dr. Harlow Shapley, director, and Mrs. Virginia McKibben Nail of Harvard College Observatory, and William Tift, Harvard undergraduate, reported.

These stars are so large the radius of each is more than five times the distance from the earth to the sun, members of the American Astronomical Society meeting at the National Bureau of Standards in Washington were told.

If centered on the sun, the planets Mercury, Venus, earth and Mars could all revolve around inside them in their customary orbits, and Jupiter would probably skim along the surface. Each star is more than a billion times the sun in volume.

The stars shine 8,000 to 21,000 times as brightly as our sun, the Harvard astronomers calculate. But because they are about 500 million billion miles away, some shine only as thirteenth magnitude stars in our heavens and thus a telescope is needed to see them.

These dozen and a half stars are all in and around the Large Magellanic Cloud, so far south that they are never seen from the United States. These groups of hundreds of millions of stars are among the

nearest of galaxies beyond our own Milky Way system. To the unaided eye they look like detached portions of the Milky Way. Photographs for the study were made at Harvard's station in the Orange Free State, South Africa.

These reddish stars, Cepheid variables, regularly become brighter, then fade out only to brighten up again. Some take 24 days to complete this cycle while others take up to 172 days to fade out and blaze forth again.

The only variable star in the heavens brighter than these reported for the first time at the meeting is the well-known bluish variable star S. Doradus. It is half a million times more luminous than the sun, and its real brightness is exceeded only by the bursts of supernovae, the brightest of "new stars."

Nearly as bright and gigantic as these Cepheid giants are half a dozen red irregular variable stars of the general type of our neighbor star Betelgeuse, bright star in the constellation of Orion, the giant Hunter, and with a diameter 400 times the sun's.

In the field of the Large Magellanic Cloud are also several giant eclipsing stars and supergiant variables, Dr. Shapley reported, but they probably are of our own Milky Way galaxy superposed on the Cloud.

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years, instead of only one baby condor in two years as has been the case.

Normally Andean Condor parents rear only one chick every two years, since the baby requires the care and attention of its parents for at least half of the two-year period. Zoo officials have stepped the rate up to one condor chick every year by taking the young chick away from its parents near the end of the first year. The adult condors immediately produce another chick—the second in the two-year interval.

Dr. Glen Crosbie, Zoo veterinarian, suggested that the first of the two eggs invariably produced each year by the San Diego condors be put in an incubator, since the parent birds either neglect or destroy this egg. Successful growth, after a 56-day incubation period, of the usually neglected egg, points the way towards production of

four times the normal number of young condors.

Death of last year's incubator baby condor is believed to have been caused by food that was too difficult for the chick to digest. Parent-reared chicks are fed on meat that has already been partly digested.

Curator of birds Kenton C. Lint and Dr. Crosbie added two digestive aids to the new condor chick formula: Lederle's Profactor B with aureomycin, one of the antibiotics, and powdered dehydrated papaya juice.

When the incubator baby condor was offered ground mouse tissue well seasoned with the two digestive aids, he accepted it eagerly, Ken Stott, Jr., general curator of the Zoo, reports. Officials are "extremely optimistic" about the survival chances of the new chick.

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## ENTOMOLOGY

## Firefly Hunt Aids Work On More Efficient Light

► **BALTIMORE YOUNGSTERS** will be out hunting fireflies for the next two months or more, gathering the glowing insects to help a Johns Hopkins University scientist find out why they light up.

They will also be helping themselves, for Dr. William D. McElroy pays them two bits for every hundred they bring in. During the present firefly season, he wants to get about 300,000 of them stowed in his deep freeze, Dr. McElroy told SCIENCE SERVICE.

He and Dr. J. Hastings of the Atomic Energy Commission will then study the chemistry of the firefly's glow. For this little insect changes chemical energy into light energy with far less loss than man has been able to do. Their studies may lead to a more efficient light for humans.

The two scientists are looking for the vitamin they believe the firefly needs to make its light. Dr. McElroy suspects this vitamin may be related to folic acid, one of the new anti-anemia vitamins needed by humans.

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## CHEMISTRY

## Artificial Perspiration Tests Metal Protection

► **SYNTHETIC HUMAN** perspiration is used in discovering how to keep fingerprints from ruining precisely machined pieces of metal.

Scientists of the Socony-Vacuum Oil Co. laboratory in Brooklyn, N. Y., are improving slushing oils used to prevent the almost invisible corrosion that occurs on precision apparatus even when they are most carefully handled.

Natural perspiration is too variable to be used in tests, although it does the damage when transferred with fingerprints to metal that is handled.

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## ORNITHOLOGY

# Incubator Baby Condor

## See Front Cover

► **AN INCUBATOR** baby Andean Condor is now in its third week of life, and growing at a "phenomenal rate." It is the second Andean Condor chick hatched in an incubator, but the first, born last year, survived only six days.

The egg was "pipped," or broken through, on May 25, and the hole was just large enough to reveal a small, persistent bill hammering away inside. Two days later the condor chick broke out of its shell.

The front cover of this week's SCIENCE NEWS LETTER shows the young chick at six days. His rudimentary comb can be easily spotted.

His survival until now has shown scientists at the Zoological Society of San Diego's Balboa Park, California, that they may be able to get four young chicks every two

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# Scorpion Moves Across Sky

Venus and Saturn also shine on July evenings. Characteristic constellations of the summer nights are easily spotted in the southern sky.

By JAMES STOKLEY

► WITH THE coming of July, the characteristic constellations of the summer evening appear in the southern skies. The most conspicuous of these is Scorpius, the scorpion, which is directly south, as shown on the accompanying maps. These are drawn to show how the skies appear at about 10:00 p.m., your own kind of standard time (or 11:00 p. m. for daylight saving time), at the beginning of July, and an hour earlier in the middle.

Scorpius is easy to recognize because of the curved line of stars to the left that form the animal's tail, while the star Antares, distinctly red in color, is supposed to represent its heart. To the right of this group we find Libra, the scales, and then Virgo, the virgin, in which the bright star Spica appears. Farther west, in the same figure, is the planet Saturn.

Continuing still farther west, we come to Leo, the lion, present location of Venus, brightest of all the planets. Regulus, the most brilliant star in this group, is not shown on the maps because it has set by

the time for which they are prepared. However, it can be seen earlier in the evening. On July 5, Venus passes quite close to this star.

To the left of the scorpion is Sagittarius, the archer, in which the stars form an easily recognized teapot. The spout of the pot is towards the right, and the handle to the left. Some of these stars also form a little dipper, known as the "milk dipper," doubtless because it stands in the brightest part of the Milky Way. The four stars that make the handle of the teapot outline the bowl of the dipper. Its handle extends upward to the right, in two of the stars forming the teapot's lid.

Directly above Sagittarius and Scorpis is a large constellation which contains no first magnitude stars. This was shown on the old star maps as a man holding a serpent. The reptile is represented by the constellation of Serpens, part of which is on each side of Ophiuchus. Serpens is the only constellation in the sky divided into two parts. The serpent's head is to the right and the tail to the left, toward the stars of Aquila, the eagle.

Aquila contains the bright star Altair. Moving upwards, we come to Lyra, the lyre, with Vega, which is the brightest star seen these summer evenings. Of course it is not nearly as bright as the planet Venus, or Jupiter, which comes up later. Below Vega, toward the northeastern horizon, is Cygnus, the swan, with the star called Deneb.

Toward the northwest we see the Great Dipper, the bowl downwards. At the bottom are Merak and Dubhe, the so-called pointers, whose direction, to the right, shows Polaris, the pole star. This is in the little dipper at the end of the handle, which now points downwards.

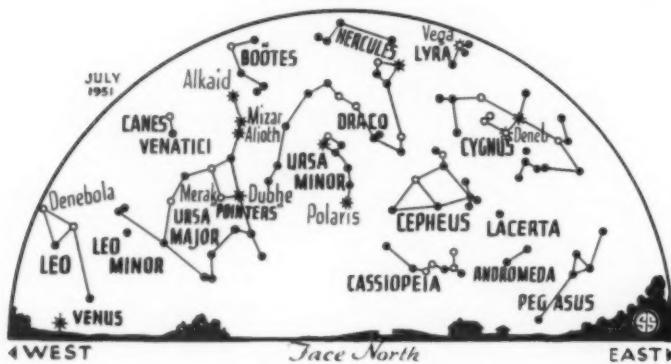
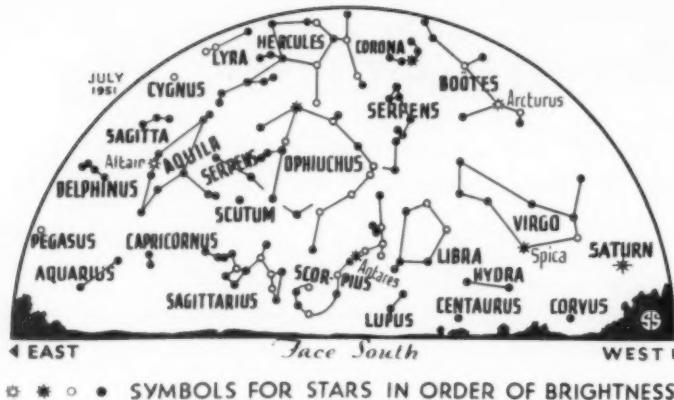
Following the curve of the handle of the Great Dipper we come in the south to Arcturus, in Boötes, the bear-driver. This is the last of the stars of the first magnitude to be seen these evenings.

As for the other planets, Jupiter comes up around midnight, in the constellation of Pisces, the fishes. It is about a sixth as bright as Venus, though about seven and a half times the brilliance of Vega. By the end of July Jupiter will appear about three hours after the sun sets.

Mars and Mercury are not easily visible in July. Though the former is in the east just before sunrise, and the latter in the west just after sunset, both are so low that

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the light of dawn and dusk makes it hard to locate them.

The next few months afford us the best opportunity of the year to see the Milky Way, which extends high across the eastern sky, through the constellations of Sagittarius, Aquila, Cygnus, and Cassiopeia. Unfortunately, it cannot be seen in competition with the glare of city lights, but summer vacationers are able to discern it from vantage points in the country or mountains. To them it appears as a luminous trail well justifying the lines of Milton, which describe it as a "broad and ample road whose dust is gold and pavement stars."

From ancient times the Milky Way was a subject of speculation, much of it fanciful. The Egyptians regarded it as the heavenly Nile, which flowed through the land where the dead live in perpetual happiness. Much later, the Norsemen knew it as the path of the ghosts going to Valhalla. The American Indians had a similar idea, according to Longfellow, who has Nokomis teaching the young Hiawatha and showing him "the broad white road in heaven . . . crowded with the ghosts, the shadows, to the Kingdom of Ponemah, to the land of the hereafter."

The Greeks speculated more scientifically about its nature. One of their philosophers, Parmenides, who lived in the 5th Century

B. C., considered that the sun and moon were formed of matter detached from the Milky Way. But a century later Democritus hit upon its correct explanation when he said it was caused by a great multitude of faint stars.

This speculation was not confirmed, however, until the invention of the telescope, and its application to astronomy by Galileo in 1610. His own observations showed that it was not made of nebulous material, as many had believed, but that, as he wrote, "it is nothing else but a mass of innumerable stars planted together in clusters."

Although Galileo showed what it was, he did not explain why the stars should be so crowded together in that direction to give such an effect. That was not to come until a century or more later, as astronomers began to learn the structure of the star-system of which we are part. According to modern ideas this system—the galaxy—has the shape of a watch, and includes something like 30,000,000,000 stars, as well as approximately an equal mass of dark material between them. Its diameter is about 100,000 light years. That is, light which travels 186,000 miles a second, would take a thousand centuries to go completely across. Its thickness is something of the order of 10,000 light years.

Our solar system is not at the center of

the galaxy, but about two-thirds of the way out to the edge. The center is toward the constellation of Sagittarius. Thus, we are surrounded in all directions by stars, but when we look towards the edge of the galaxy, we can see into a much greater depth than if we look out toward the sides. Therefore, we find a great many more stars in those directions. Since they are so distant that we cannot distinguish them separately with the naked eye, they seem to merge into the Milky Way. Thus, the stars are not necessarily more closely packed in those directions, but they are far more numerous.

Moreover, since the center of the watch-shaped system is toward Sagittarius, we see the greatest aggregation of stars in that direction. This explains why that is the brightest part of the Milky Way. Indeed, we would see even more were it not for the dark material, also most concentrated in that direction. Photography by infrared rays cuts through these clouds to some extent, and such pictures show many more stars toward Sagittarius than are revealed in photographs taken by rays similar to those to which the eye is sensitive.

### Celestial Time Table for July

July	EST	
2	11:00 p. m.	Moon farthest, distance 252,- 600 miles
4	2:48 a. m.	New moon
	5:00 p. m.	Sun farthest from earth, dis- tance 94,459,000 miles
8	3:27 a. m.	Moon passes Venus
10	10:36 a. m.	Moon passes Saturn
11	11:56 p. m.	Moon in first quarter
17	6:00 p. m.	Moon nearest, distance, 222,- 600 miles
18	2:17 p. m.	Ful moon
24	7:19 a. m.	Moon passes Jupiter
25	1:59 p. m.	Moon in last quarter
28	Early a. m.	Meteors visible radiating from constellation of Aquarius
29	1:00 a. m.	Venus at greatest brilliancy, magnitude minus 4.2
30	7:00 a. m.	Moon farthest, distance 252,- 600 miles

Subtract one hour for CST, two hours for MST, and three for PST.

Science News Letter, June 30, 1951

## INVENTION

## Sonic Device Aids Towing Glider in Heavy Overcast

► SAFETY TO a glider plane being towed in deep overcast by a powered plane is aided by a sonic device which brought patent 2,557,900 to Robert L. Wallace, Jr., Coolidge, Texas, and Harold L. Ericson of Los Angeles. Rights are assigned to the Secretary of the Navy.

The towing plane emits special sound signals picked up in the glider by a device converting them into visual meter readings. Noise signal will carry to the glider in spite of noise conditions in the air.

Science News Letter, June 30, 1951

## MEDICINE

# Mimic Curare Effect

► THREE SYNTHETIC chemicals, designed to mimic some effects of the old South American arrow poison, curare, will soon be available to help patients undergoing surgical operations.

In the more distant future, patients paralyzed because something has gone wrong with their muscle-nerve mechanism may benefit from research with these and related chemicals reported at the meeting of the New York Academy of Sciences in New York.

The new chemicals are named by their manufacturers Flaxedil, Syncurine and Mytolon. They differ from each other in chemistry and to some extent in their effects on the human body. But all of them are able to relax muscles.

It is this muscle-relaxing power which makes the various curare compounds and the synthetic chemicals useful for patients undergoing surgical operations. Less anesthetic is needed when the curare chemicals are used.

"In anesthesia there is no longer any question as to whether curare is useful, but rather whether particular anesthetic

agents or other curare-like drugs have added advantages," Dr. A. Dale Console, associate director of E. R. Squibb and Sons, New York, declared.

From the relaxation it produces in operations on the abdomen, its use has been extended, he pointed out, to operations on the chest and lungs, orthopedic manipulations such as setting broken bones and reducing dislocated joints, eye surgery and childbirth. It has been useful for controlling hiccoughs, among other conditions. One big use for it has been to prevent broken bones and dislocations in psychiatric patients undergoing shock and convulsive treatment.

While curare and the curare-like chemicals block the transmission of nerve impulses to muscles, some of them do it in different ways. Further study of these drugs, in the opinion of Dr. Edwin J. DeBeer and associates of the Wellcome Research Laboratories, Tuckahoe, N. Y., "may throw further light on the fundamental processes involved in the transmission of impulses from nerve to muscle."

Science News Letter, June 30, 1951

## ASTRONOMY

# Newest Known Moon

► THE NEWEST known moon in the solar system follows such an elongated path around the distant planet Neptune that sometimes it is only 1,000,000 miles from its parent planet, sometimes it is 6,000,000 miles away. Dr. G. Van Biesbroeck of Yerkes Observatory of the University of Chicago told members of the American Astronomical Society meeting in Washington.

Nereid, as this satellite is called, takes almost a year to travel around Neptune. Its path is shaped like a fat cigar, three times as long as it is wide, with Neptune near one end.

"No other satellite has anywhere near such a high eccentricity," Dr. Van Biesbroeck pointed out.

Triton, Neptune's other satellite, follows a circular path and stays about 220,000 miles from the planet. It takes five days 21 hours to circle Neptune, as compared with 359 days almost 10 hours for Nereid to complete its journey.

Strangely enough, Triton and Nereid circle Neptune in opposite directions. Nereid moves in the direction in which its planet and others in the solar system rotate, but not Triton.

Triton is a little larger and heavier than the earth's moon. Dr. Van Biesbroeck calculates that Nereid is only one-fourteenth as massive as our moon.

Triton has been known for over a hundred years, but Nereid was not discovered until about two years ago. It was spotted by Dr. Gerard P. Kuiper, also of Yerkes Observatory, who the preceding year had located a fifth moon for the planet Uranus. Dr. Kuiper's latest find brought to 30 the number of moons known to exist in the entire solar system.

The faint satellite Nereid, of 19th magnitude, was picked up with the 82-inch reflecting telescope of McDonald Observatory of the University of Texas, the observatory being operated by Yerkes astronomers. To date the satellite has been photographed on 19 nights, states Dr. Van Biesbroeck who with the same telescope has tried to observe Nereid whenever opportunity offered.

Science News Letter, June 30, 1951

## NATURAL RESOURCES

## Plants Adapted to Dry Land Make Deserts Useful

► THE WESTERN deserts of America could be made fruitful without the cost and work of irrigation. Scientific breeding and mechanical harvesting of plants already adapted to burning suns, drying winds and infrequent rainfall, could turn deserts to man's use, Dr. Raymond B. Cowles, pro-

fessor of zoology at the University of California at Los Angeles, suggests.

In years past many thousands of Indians were able to live in the deserts of the West because they were familiar with the native food-producing plants, he observes.

Dr. Cowles lists these food-producing plants which might be standardized by breeding and adapted to ordinary harvesting machines: dropseed grain used by the Indians, a variety of mint called chia, and bunch grasses for cattle food.

The western deserts also have plants that produce tobacco, natural dyes, strong fibers, aromatic oils, vegetable fats and waxes, insecticides, weed killers, and drugs that might be used in the treatment of human diseases.

In addition to these native plants, Dr. Cowles would import from deserts in other parts of the world, those plants that would produce foods or commercially-useable products.

Science News Letter, June 30, 1951

## GENERAL SCIENCE

## Patent System Inquiry Is Object of New Foundation

► AN INQUIRY into the American patent system and its benefits to our standard of living, industry, research and development has been launched through the formation of the Patent Foundation under the George Washington University in Washington.

Designed to conduct research projects in the broad field of patent policy, law and practice, the newly created body will study patents as invention incentives, corporate patent practices, employment as affected by patents, anti-trust aspects of the patent system and other similar aspects.

Members of the advisory council include: Dr. Joseph W. Barker, president of the Research Corporation; Dr. Vannevar Bush, president of the Carnegie Institution of Washington; Cyrus S. Ching, director of Federal Mediation and Conciliation Service; John W. Davis, attorney; Dr. Charles F. Kettering, General Motors director, and Max McGraw, president of McGraw Electric Co.

Science News Letter, June 30, 1951

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## MEDICINE

## Lack of Use and Vitamins Cause Temporary Blindness

► LACK OF use and lack of vitamins are probably the cause of the blindness reported in the Nazi soldier rescued after six years entombment in an underground supply depot.

Eye specialists see the same kind of blindness in patients who have to wear a patch over an eye for a very long time.

The Nazi soldier should recover his eyesight in a week or 10 days, though he may have to wear a bandage over his eyes for much of that time. His eyes, after the long time in the darkness, are probably very sensitive to light. This would make it hard for him to open them enough to tell whether or not he can see. The bandage will be necessary while his eyes are getting over their light sensitivity.

Temporary blindness of much this sort was seen in prisoners of war immediately after release from Japanese prison camps. The trouble in these men was caused by poor diet, rather than by lack of light and use of their eyes. Even though the supply depot had enough food to keep the Nazi soldier alive for the reported six years, he must have lacked fresh food to supply vitamins A and B.

His nerves for seeing probably were not damaged and this will allow him to regain his eyesight.

The permanent blindness suffered by fish which live in caves did not come on in six years but evolved slowly.

Science News Letter, June 30, 1951

## INVENTION

## Remove Poultry Feathers By Cold Water on Skin

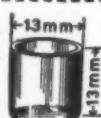
► SCALDING OF poultry as an aid to removing the feathers is not required in a method for which Seth S. Barker, Ottumwa, Iowa, was awarded patent 2,557,335. It utilizes a device by which the feathers are stood upright, exposing the skin. Then cold tap water is applied direct to the fowl.

Science News Letter, June 30, 1951

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## BOTANY

## NATURE RAMBLINGS



Poison Sumac

► MOST PEOPLE, when they hear for the first time that poison ivy is really a sumac, are inclined to be a little incredulous. The plant does not really look much like a sumac. But it takes no argument in the case of poison sumac. This venomous shrub of the bogs is hard to distinguish, at first glance, from its harmless cousin of the uplands.

It is very easy to get poisoned with poison ivy; that happens on Sunday school picnics and the mildest of country walks, for poi-

son ivy is everywhere. Poison sumac is reserved for slightly hardier souls, who go in for hiking or nature-study activities that may require wet feet, because poison sumac is a creature of the bog-edges, and does not grow in upland woods at all.

This is perhaps fortunate, for though fewer persons are susceptible to it, the luckless ones it does affect get a much worse "dose," usually, than poison ivy is able to inflict.

Poison sumac is easy enough to identify, although it looks much like ordinary sumac, except that its bark is a pallid gray.

The chief stigmata by which the poisonous sumac may be separated are the fruits. Last year's fruit-clusters persist on both kinds, as a rule, so that they may be looked for at any season. Poison sumac fruits are lax clusters of pallid white berries, hanging down. Common sumac fruits are tiny dark-brown or sooty things that look a good deal like coarse coffee grounds, and their dense clusters stand stiffly erect.

Furthermore, the two plants grow in totally different kinds of terrain. Poison sumac is a shrub of lowlands, preferring the soggy soil of acid-water bogs. Common sumac is a plant of the well-drained upland soils.

A third sumac, the harmless staghorn sumac, grows in wet places, but it can be told from the poisonous species by the sooty fuzz on its upper branches, and by its fruits, which are like those of the common sumac.

Science News Letter, June 30, 1951

## ENGINEERING

## Good Roads for Defense

► THE IMPORTANCE of good roads from a military standpoint was stressed at the American Congress on Surveying and Mapping meeting in Washington by Col. John G. Ladd, commanding officer of the Army Map Service. Roads are equally important to the progress, general welfare, and the defense of our country, he said.

Many of the important events in our military history have centered around roads, and battles have been won or lost, depending upon the existence or lack of them, he added. An intimate knowledge of terrain is a strong asset in any military operation. This was proved during the Revolutionary War where the ragged troops of George Washington, due to their knowledge of the countryside, successfully defended our country against vastly superior British forces.

Behind the selection of sites for the construction of highways is the need for good maps, including those showing topographical features. Most of our vital defense plants are situated near and dependent upon the principal routes of communication, he stated.

The responsibility of defending these plants and maintaining these routes is becoming increasingly larger due to the fact that the plants are decentralized. They are producing separate parts of the finished product at scattered points and bringing them together for final assembly. If one of these plants were bombed by hostile aircraft, only a part of a decentralized plant would be destroyed. Our defense industry activities depend upon our highway system for access to sources of supply and distribution of finished products.

Since maps give a complete and accurate terrain picture, they are invaluable to our military commands in determining what points would be vulnerable to enemy attack. With the knowledge of topography gained through the use of maps, defense plans could more readily be made for the deployment and movement of troops, positioning of artillery, maintenance of supply lines, and the selection of strategic points at which to stockpile materials and equipment that would be immediately available for the reconstruction of any of the vulnerable points affected.

Science News Letter, June 30, 1951

# Books of the Week

TO SERVE YOU: To get books, send us a check or money order to cover retail price. Address Book Dept., SCIENCE NEWS LETTER, 1719 N St., N. W., Washington 6, D. C. Ask for free publication direct from issuing organizations.

THE ACANTHACEAE OF COLOMBIA, I.—Emery C. Leonard—*Govt. Printing Office*. Contributions from the United States National Herbarium, Volume 31, Part 1, 117 p., illus., paper, 50 cents. The Acanthaceae include many showy and beautiful plants which are or should be in cultivation. The family is especially well developed in Andean America.

ANATOMY IN SURGERY—Philip Thorek—*Lippincott*, 970 p., illus., \$22.50. Providing an important part of the training of the young surgeon. Lavishly illustrated.

ANIMAL EVOLUTION: A Study of Recent Views of Its Causes—G. S. Carter—*Sidgwick and Jackson*, 368 p., illus., \$4.50. Presenting a modern theory which will not be at variance with the findings of zoology.

CHEMISTRY OF MUSCULAR CONTRACTION—A. Szent-Gyorgyi—*Academic Press*, 2d ed. rev., 162 p., illus., \$4.50. Reports results of the author's pioneering research conducted in Hungary under Nazism, in underground hiding places and under troubled conditions together with later research completed in the United States.

COMMUNICATION: The Social Matrix of Psychiatry—Jürgen Ruesch and Gregory Bateson—*Norton*, 314 p., illus., \$4.50. A psychiatrist and an anthropologist collaborate to make this contribution to the new science of communication. This is a non-mathematical work attempting to show how value theory, psychiatric thinking and observations about American culture are intimately connected.

THE COMPONENTS OF THE BITUMEN IN ATHABASCA SAND AND THEIR SIGNIFICANCE IN THE HOT WATER SEPARATION PROCESS—D. S. Pasterнак and K. A. Clark—*Research Council of Alberta*, 14 p., paper, 15 cents.

GEOLGY AND MINERAL RESOURCES OF THE NEENACH QUADRANGLE, CALIFORNIA—John H. Wiese—*California Division of Mines*, 53 p., illus., \$1.75. Accompanied by a set of maps, including geologic map in color. This section has famous earthquake fault zones and deposits of important minerals.

GEOLGY OF THE BLUE LAKE QUADRANGLE, CALIFORNIA—George A. Manning and Burdette A. Ogle—*California Division of Mines*, 36 p., illus., paper, \$1.50. A description of a very little known region. Report is accompanied by a set of geologic and other maps.

INTERPLANETARY FLIGHT: An Introduction to Astronautics—Arthur C. Clarke—*Harper*, 164 p., illus., \$2.50. The assistant secretary of the British Interplanetary Society describes the problems that must be solved before you can take off on an "all-expense tour" of outer space.

AN INTRODUCTION TO MODERN PSYCHOLOGY—O. L. Zangwill—*Philosophical Library*, 227 p., illus., \$3.75. Providing for self instruction an outline of the science from the biological standpoint.

LEARNING TO SUPERVISE SCHOOLS: An Appraisal of the Georgia Program—Jane Fransteth—*Govt. Printing Office*, 50 p., paper, 30 cents. A study of the Office of Education.

THE LIFE AND OPINIONS OF A COLLEGE CLASS—*Harvard University Press*, 98 p., \$2.50. The class of 1926 take stock of themselves 25 years after graduation, counting gray heads and bald pates, incomes and achievements, all of which is reported in an entertaining way. Included is what the wives think of Harvard men in general and their husbands in particular.

MANUAL OF MASSAGE AND MOVEMENTS—Edith M. Prosser—*Lippincott*, 388 p., illus., \$5.00. A British trained nurse and physiotherapist describes for students all the different movements in massage and medical gymnastics, their effects and purposes.

NUTRITION FRONTS IN PUBLIC HEALTH—Icie G. Macy and others—*National Vitamin Foundation*, 168 p., paper, \$1.50. Proceedings of a symposium held at Yale University.

POLYPHASE COMMUTATOR MACHINES—B. Adkins and W. J. Gibbs—*Cambridge University Press*, 230 p., illus., \$4.00. A book by British designers for students and engineers.

PRINCIPLES OF HUMAN GEOGRAPHY—Ellsworth Huntington, revised by Earl B. Shaw—*Wiley*, 6th ed., 805 p., illus., \$6.25. This well-known work by the late Dr. Huntington has been reorganized and re-written to make it more practical for teaching purposes.

ROCKETS, MISSILES, AND SPACE TRAVEL—Willy Ley—*Viking*, 436 p., illus., \$5.95. An authority on rockets discusses flight in space and indulges in flights of fancy, proposing, for example, a military base on the moon. Some material appeared previously, much is new.

WHAT TO MAKE WITH CONCRETE: A Complete Guide to Concrete Work for Home and Farm—*Popular Mechanics Press*, 112 p., illus., \$2.00. A how-to-do-it book for the home craftsman. Things to make include outdoor fireplaces, dry cellars, and even swimming pools.

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## ASTRONOMY

### Twin Systems of Stars Betray Mass of Universe

► TWIN SYSTEMS of stars provide the best means available for determining the mean density of the universe, Dr. Thornton Page of Yerkes Observatory of the University of Chicago told members of the American Astronomical Society meeting at the National Bureau of Standards in Washington.

The average double galaxy is only about as massive as 50 trillion suns, Dr. Page reported. This means the universe as a whole can boast of little matter, only about one pound in the space occupied by 30,000 earths. Actually, Dr. Page calculates there is only .000,000,000,000,000,000,000,000,000,01 (decimal point, 28 zeros and the number 1) gram of matter per cubic centimeter of space.

Just as the masses of double stars can be approximated, so can the total mass of double systems of stars and nebulae be estimated by calculating their distance apart and the speed with which these huge aggregations of stars swing around each other.

Dr. Page studied 20 systems of twin galaxies close together and believed to be rotating around each other. Applying the techniques used on double stars, he computed the total mass of each twin system, with the possibility of the value found being at least one-third too large or too small. This is the only direct means astronomers have for determining masses of stars or galaxies in the universe.

Science News Letter, June 30, 1951

Most flashlights can be used under water without damage.

Streptomycin production in the United States was over 190,000 pounds in 1950.

## ERRATA, Vol. 59, Nos. 1-26, January-June, 1951

PAGE	TITLE BEGINS	CORRECTION
9	Plan To Develop	First 2 lines, read The mineral known as pegmatite is to be mined. . . .
16	New Machines	Bulletin 551 for 552.
23	Caption	Line 3, "u" for "n."
24	Wrong-Way Pigeons	Par. 3, line 7, two hours for a year.
103	Improved Artificial Hands	Delete last two sentences, beginning "Above-knee" and ending "satisfactory fit".
165	X-rays at the Front	Par. 5, Second sentence, read Development of it for practical X-ray purposes was done by Polaroid engineers in consultation with Picker X-ray Corporation who will manufacture the cassette and processing unit.
203	Celestial Time Table	Line 19, 7:17 a.m. for 7:17 p.m.
219	Military Experience	Par. 6, line 4, four for five.
223	Arctic Floating Islands	Col. 2, line 6, Dr. Emery now at University of Southern California.
294	Heart Can Absorb	Par. 3, line 4, Conrad S. Fischer for Conrad C. Fischer.
306	Faint Double Star	Par. 2, line 8, 2,500 for 500; col. 2, par. 2, line 1, trillion for million.
328	Antihistamines Cause	Par. 5, add Results do not necessarily hold true for other antihistamine drugs which are different chemical compounds.
329	Inexpensive Smokeless	Par. 3, line 5, 2,549,788 for 2,549,778.
341	Chain Reaction	Par. 2, lines 3-4, read awarded second place in the 1951 Van Meter prize competition of the . . .

# • New Machines and Gadgets •

For addresses where you can get more information on the new things described here, send a three-cent stamp to SCIENCE NEWS LETTER, 1719 N ST., Washington 6, D. C. and ask for Gadget Bulletin 576. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

• **PLAYHOUSE** for the youngsters, a tent-like affair made of Vinylite plastic, can be hung on a clothesline and is decorated to resemble a cottage. Dismantled and packed with its knockdown frame, the eight-by-four-foot shelter fits a carton four inches square and 50 inches long.

Science News Letter, June 30, 1951

• **"OIL-EYE"** on the automobile dashboard shows a driver the level of motor and transmission oil. Hose lines connect it to crank case and automatic transmission. When a button is pushed, the gauge fills if the crankcase oil is at proper level; pushing another button gives transmission-oil condition.

Science News Letter, June 30, 1951

• **PORTABLE WASHING** machine, which can handle a five-pound load and is mounted on rollaway casters to permit easy storing, has a powerful pump to empty wash water into sink or lavatory. When a button is pushed the agitator is stopped while the pressure pump empties the tub.

Science News Letter, June 30, 1951

• **"EXPANDED" METAL**, usable for many industrial and household purposes, resembles wire fencing with diamond-shaped



openings, but is made from solid sheets in a huge press with a serrated knife blade, as illustrated in the photograph. After cutting it is stretched to a width of some 10 times that of the original sheet.

Science News Letter, June 30, 1951

• **FOOT-TREATMENT** device, a recently patented invention for use in relieving pains due to poor circulation, provides massage,

heat and intermittent mild electric shocks to the sole of the foot. The application of heat and shock simultaneously is followed by simultaneous heat and vibration treatment.

Science News Letter, June 30, 1951

• **OUTDOOR REGISTER** for an indoor gas meter, recently patented, enables the "gasman" on his monthly visits to determine the amount of gas used without entering the house. It is called a "remote register" and is operated by the mechanism in the inside meter.

Science News Letter, June 30, 1951

• **BRUSH** FOR cleaning table glasses is the familiar type with nylon bristles on the end and sides of a wood rod, but this has a base with rubber suction cups so that it stands upright in the sink or dishpan. It washes glasses quickly with a one-handed operation.

Science News Letter, June 30, 1951

• **WOBBLE-STOPPERS**, fixed with pins to the ends of table legs, provide automatic adjustment to the irregularities of the floor. They operate hydraulically, using silicone "bouncing" putty for their action. They expand or contract to bring four-leg contact.

Science News Letter, June 30, 1951

## Do You Know?

The beaver-like *coypu*, which yields fashionable nutria fur, is a native of the South American Andes but a few specimens brought to Louisiana 20 years ago have resulted in thousands.

The common garden spider is helpful to man because it captures great numbers of insect pests.

Shading the roof of a house in the hot summer reduces the temperature of the air within the dwelling to a marked degree.

Lithium, the lightest known metal, weighs about one-half as much as water.

A shortage of *sulfur* makes a shortage of sulfuric acid, an essential chemical in many industrial processes.

Pound for pound, *rabbit meat* has the same food value as beef.

The duck hawk is claimed to be the fastest flying bird.

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